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Metabolic Syndrome in Patients with Gallstone

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Abstract

Background: Metabolic Syndrome (MetS) is defined as a cluster of multiple cardiovascular risk factors, including central obesity, elevated fasting plasma glucose, high blood pressure, dyslipidemia. The prevalence of MetS has been increasing gradually in the world and there are many hypotheses about relationship between metabolic syndrome and others diseases. The aim of this study is evaluation of prevalence of metabolic syndrome in the patients with gallstone disease.

Methods and materials: 400 patients with gallstone disease entered in a cross sectional study. Medical files were extracted and metabolic syndrome was defined by Adult Treatment Panel III (ATP III) base on clinical data.

Results: Metabolic syndrome was diagnosed in 213 (53.3%) subjects. In this group, 175 (82.2%) had their gallstone both in gall bladder and biliary tract and 38 (17.85) only in biliary tract. In patients without metabolic syndrome, 127 (67.9%) had the gallstone in both gallbladder and biliary tract and 60 (32.1%) only in their biliary tract. Comparison of these ratios led to a statistically significant difference (P=0.001; Odds Ratio: 2.18; CI 95%: 1.36-3.47).

Conclusions: The results showed that may be a relationship between metabolic syndrome and gallstone disease. More future study with control group for this evaluation is necessary.

Keywords: Metabolic syndrome; Gallstone

Background

Metabolic syndrome as a combination of metabolic derangements is a known risk factor for developing diabetes mellitus and coronary artery disease [1]. Metabolic syndrome mainly presents with central obesity, high serum triglyceride level, low HDL cholesterol, hyperglycemia and hypertension [2,3]. The overall prevalence is 23.7%, though it varies among different populations [4-6]. Metabolic syndrome is more prevalent in diabetics and patients with coronary artery disease [7-9]. Moreover, a correlation has been shown between gallstone and diabetes by Pacchioni et al. [10] and Sasazuki et al. [11] and between gallstone and diabetes by Clark and El-Atat [12] and Gami et al. [13]. Epidemiologic studies, on the other hand, have shown that obesity and hyperinsulinemia are correlated with cholesterol biliary stones [14,15].

This study was done to evaluate association between metabolic syndrome and gallstone, because of similarities between the risk factors for gallstones and constituents of metabolic syndrome.

Methods and Materials

This cross sectional study was performed on 400 patients with known biliary tract stone referred to Taleghani Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran in 2012. Those with history of biliary system cancer or liver cirrhosis were enrolled from study.

Hospital charts were recruited if there had been a diagnosis of biliary stone by abdominal ultrasonography, MRCP or ERCP and relevant data (including demographics, number and location of stones and components of metabolic syndrome) were collected. Metabolic syndrome was defined if 3 out of 5 following criteria (Adult Treatment Panel III=ATP III criteria) were met:

1) Waist>102 cm in males and >88 cm in females
2) Serum TG>150 mg/dL OR being treated for hypertriglyceridemia
3) Serum HDL<40 mg/dL in males and <50 mg/dL in females OR being treated for low HDL level
4) Blood Pressure>130/85 mmHg OR being treated for high blood pressure
5) FPG ≥ 100 mg/dL OR being treated for high blood sugar

Frequencies and ratio were considered for qualitative variables; whereas mean and standard deviation were applied for quantitative ones. Statistical analyses were done applying independent t-test test to compare qualitative and Chi-square test to compare frequencies. Acceptable type I error was 5%. All statistical analyses were done by SPSS-15.

Results

Medical charts of 400 patients with mean age of 57.6 ± 19.2 years, including 170 males (42.5%) and 230 females (57.5%) were reviewed. Table 1 shows the BMI (body mass index), average waist, systolic and diastolic blood pressure of studied patients. 74 (18.5%) patients had history of cardiovascular disease and 76 (19%), 106 (26.5%) and 114 (28.5%) had diabetes mellitus, hyperlipidemia and hypertension, respectively.

Table 2 depicts the laboratory findings in patients. Gallbladder stone was diagnosed in 298 (74.5 %) by ultrasonography, 56 (14%) by MRI and 228 (57%) by ERCP and biliary tract stone was diagnosed in 218 (54.55) by ultrasonography, 86 (21.55) by MRI and 228 (57%) by ERCP. 302 (75.5%) had stones in both gallbladder and biliary

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BMI	
<19	4 (1%)
19-25	86 (21.5%)
15.1-30	218 (54.5%)
30.1-35	84 (21%)
>35	8 (2%)
Obesity	96 (24%)
waist (cm)	95.9 ± 11.2
Systolic Blood Pressure (mmHg)	121 ± 19.3
Diastolic Blood Pressure (mmHg)	73 ± 9

Table 1: Characteristics of patients.

Fasting Blood sugar (mg/dL)	112.4 ± 76*
Serum Triglyceride (mg/dL)	144.2 ±105.6
Serum Cholesterol (mg/dL)	183.2 ±50
Serum HDL (mg/dL)	40.3 ±13.6
Serum LDL (mg/dL)	107.9 ±35.7
AST (µg/dL)	92.1 ±32.8
ALT (µg/dL)	113.6 ±65.2
Alkaline Phosphatase (µg/dL)	447.3 ±416.2
Total Bilirubin (mg/dL)	3.3 ±2.7
Direct Bilirubin (mg/dL)	1.9 ±1.4
Serum amylase (µg/dL)	123.5 ±96.3
Serum Lipase (µg/dL)	62.6 ±59.3
ESR (/1 hr)	21.6 ±19.7
CRP (mg/L)	28.3 ±25.8
INR	1.16 ±0.31
TSH (µIU/mL)	3.7 ±3.4
T3 (ng/dL)	62.2 ±56.1
T4 (µg/dL)	8.8 ±2.5
Serum Calcium (mg/dL)	9.3 ±0.9
Serum Phosphorus (mg/dL)	3.5 ±1

* mean ± standard deviation

Table 2: Laboratory data in patients.

tract and 98 (24.5%) had their stone only in biliary tract. Abdominal ultrasonography also detected fatty liver in 30 (7.5%) patients (grade I in 19; grade II in 9 and grade III in 2).

Metabolic syndrome was diagnosed in 213 (53.3%). In this group, 175 (82.2%) had their gallstone both in gall bladder and biliary tract and 38 (17.85) only in biliary tract. In patients without metabolic syndrome, 127 (67.9%) had the gallstone in both gallbladder and biliary tract and 60 (32.1%) only in their biliary tract. Comparison of these ratios led to a statistically significant difference (P=0.001; Odds Ratio: 2.18; CI 95%: 1.36-3.47). In other words, metabolic syndrome was more prevalent (57.9%) in gallbladder stone patients compared to patients with stone only in biliary tract (38.8%).

There was also a statistical significant difference between the prevalence of metabolic syndrome in different genders. Metabolic syndrome was diagnosed in 61.3% female patients with gallstones compared to 42.3% male patients with gallstones. (P<0.001; odds ratio=1.39, CI95%:1.16-1.66) (Figure 1).

Moreover, there was a significant difference between average age of patients with metabolic syndrome (62.2 ± 17.1 years) and without metabolic syndrome (52.9 ± 20 years) (P<0.001) (Figure 2).

Discussion

This study showed 53.3% (213 out of 400 patients) had metabolic syndrome by Adult Treatment Panel III=ATP III criteria, that higher

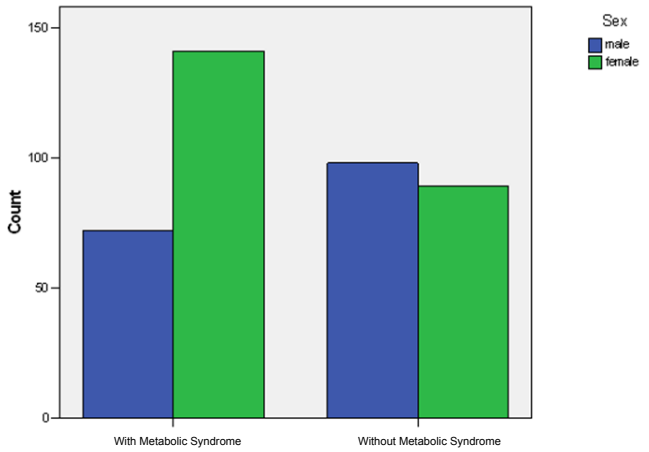

Figure 1: Prevalence of metabolic syndrome in males and females.

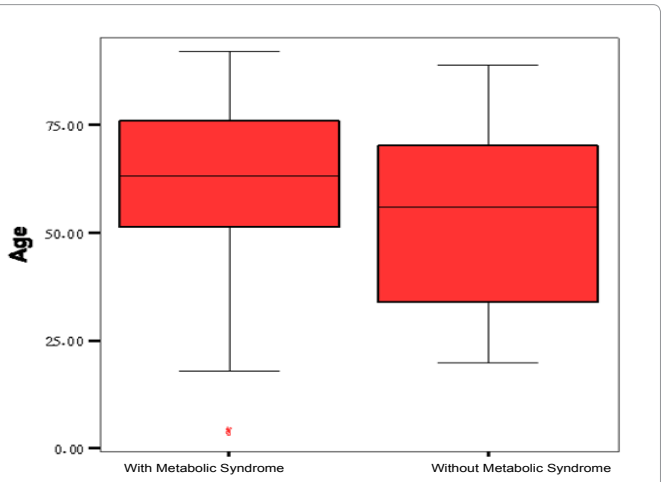

Figure 2: Age comparison between patients with and without metabolic syndrome. There was a significant difference between mean age of patients with metabolic syndrome (62.2 ± 17.1 years) and without metabolic syndrome (52.9 ± 20 years) (P<0.001).

than previous studies. The overall prevalence is 23.7%, though it varies among different populations [4-6], so that it was 40% in Méndez-Sánchez et al. study [16]. In our study, patients with metabolic syndrome had their gallstone both in gall bladder and biliary tract in 175 (82.2%) and only in biliary tract in 38 (17.85). In patients without metabolic syndrome, 127 (67.9%) had the gallstone in both gallbladder and biliary tract and 60 (32.1%) only in their biliary tract. Comparison of these ratios led to a statistically significant difference (P=0.001; Odds Ratio: 2.18; CI 95%: 1.36-3.47). In other words, patients with metabolic syndrome had gallstones in both gallbladder and biliary tract 2.2 times more often than patients without metabolic syndrome. More studies have shown a correlation between gallstone and some diseases representing metabolic syndrome, such as diabetes [10-13] and also obesity and hyperinsulinemia [14,15].

Most of our patients were females between 40-70 years of age. Majority of patients had come to medical care because of symptomatic gallstone disease and severity of symptoms or complications led to their hospitalization; therefore, results of this study should be seen in the context of symptomatic gallstone disease.

We could not evaluate the type of gallstone which could be of importance in interpreting the results of relation to metabolic syndrome. Further studies are needed to investigate whether metabolic syndrome is correlated with specific types of gallstones.

Our study also showed a higher prevalence (1.4) for metabolic syndrome in female patients with symptomatic gallstone disease. We also found an older average age in patients with metabolic syndrome.

Regarding the lack of a control group in our study, accurate testing of correlations between gallstone and metabolic syndrome is not possible; however, the association seems very likely and further studies including a control group to look better at this correlation seem mandatory.

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